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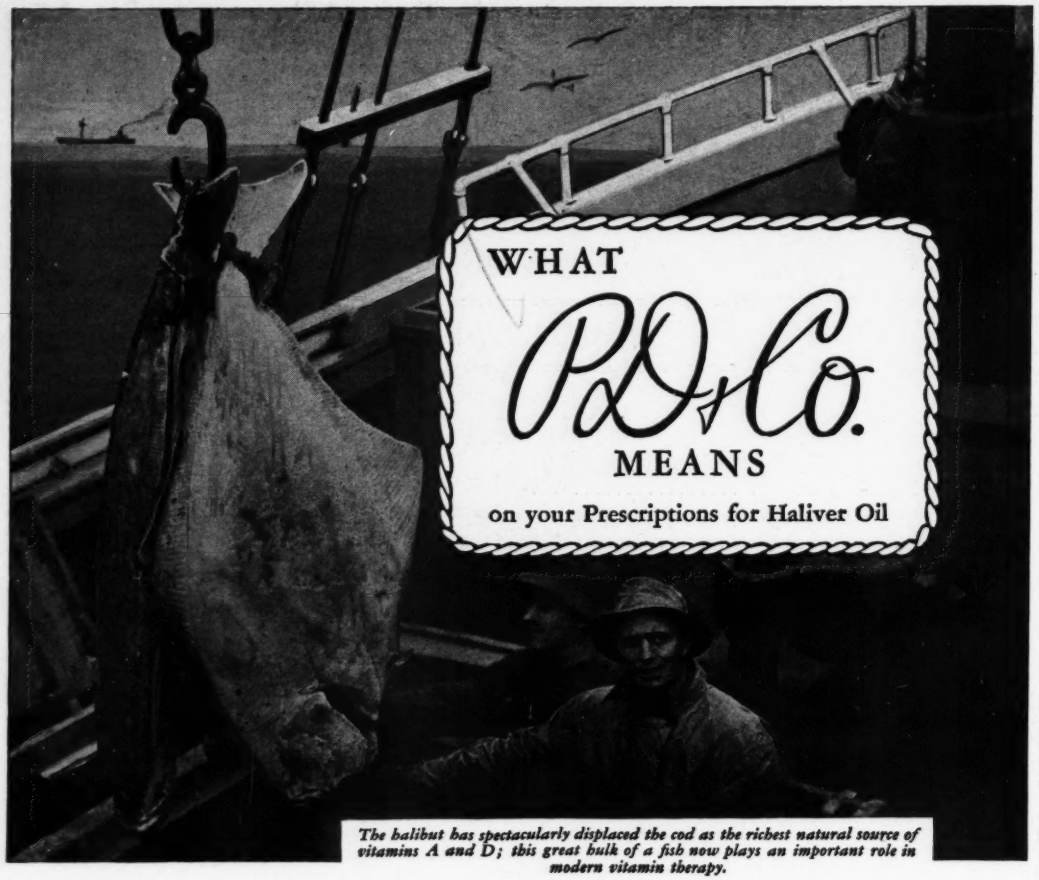

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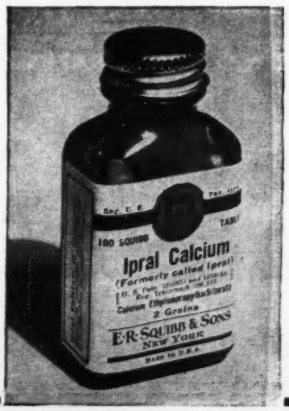

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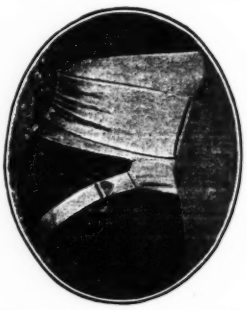

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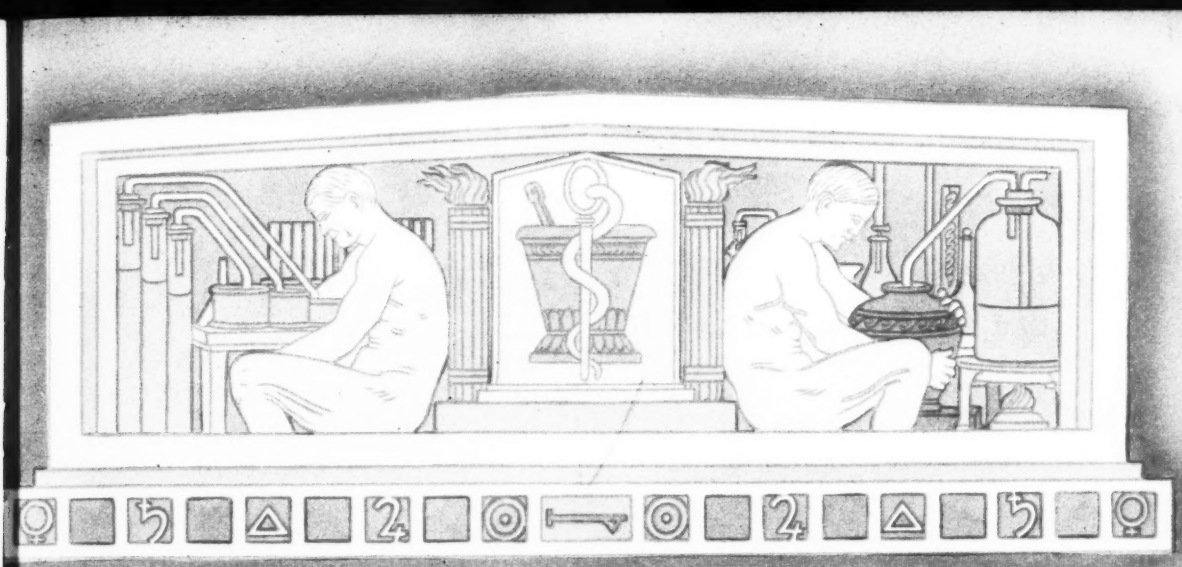

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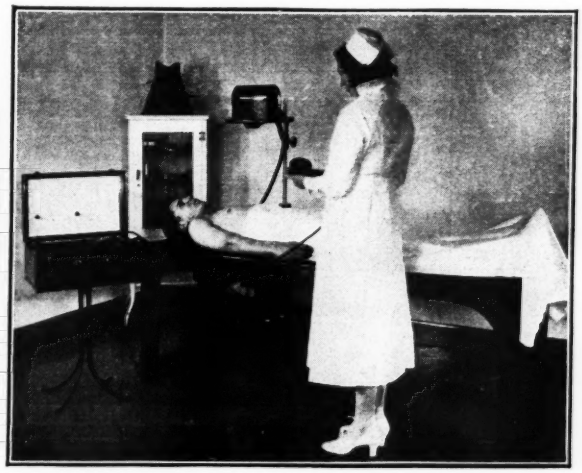

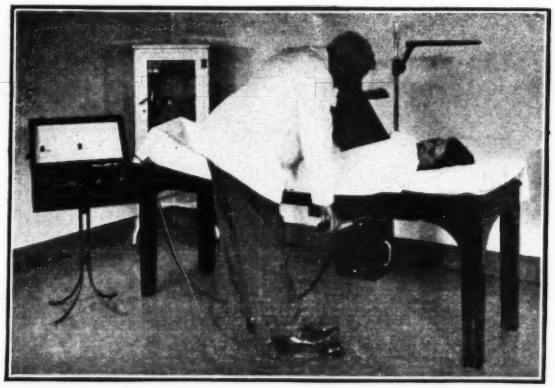

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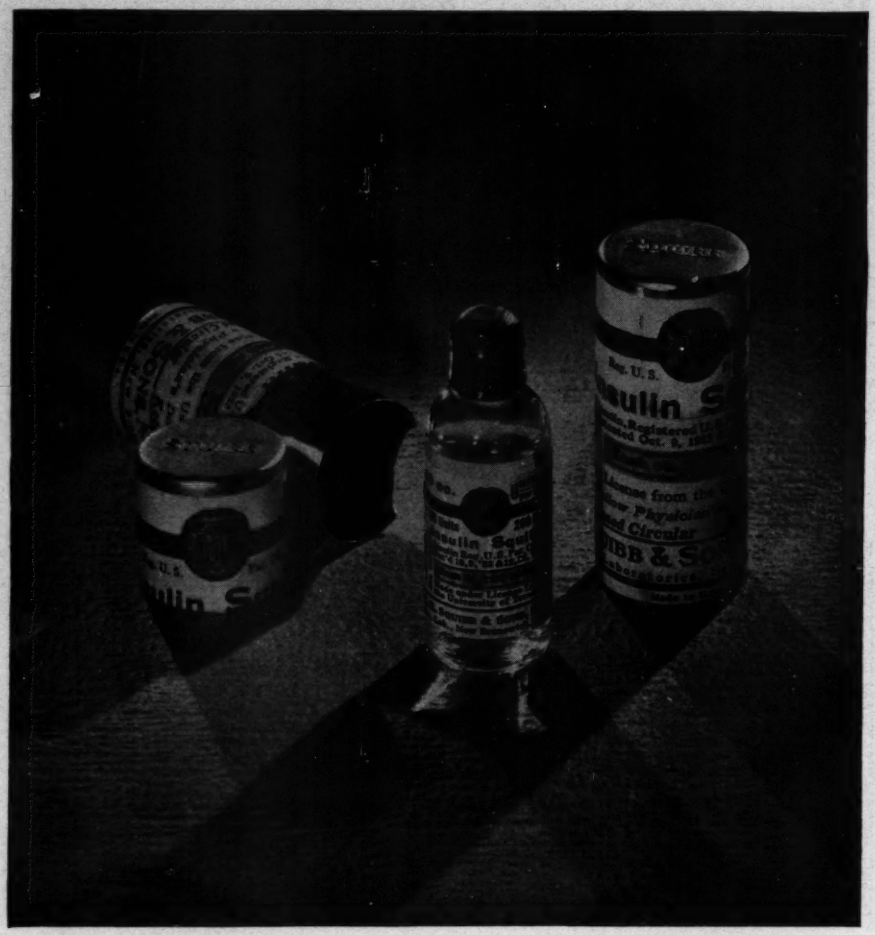

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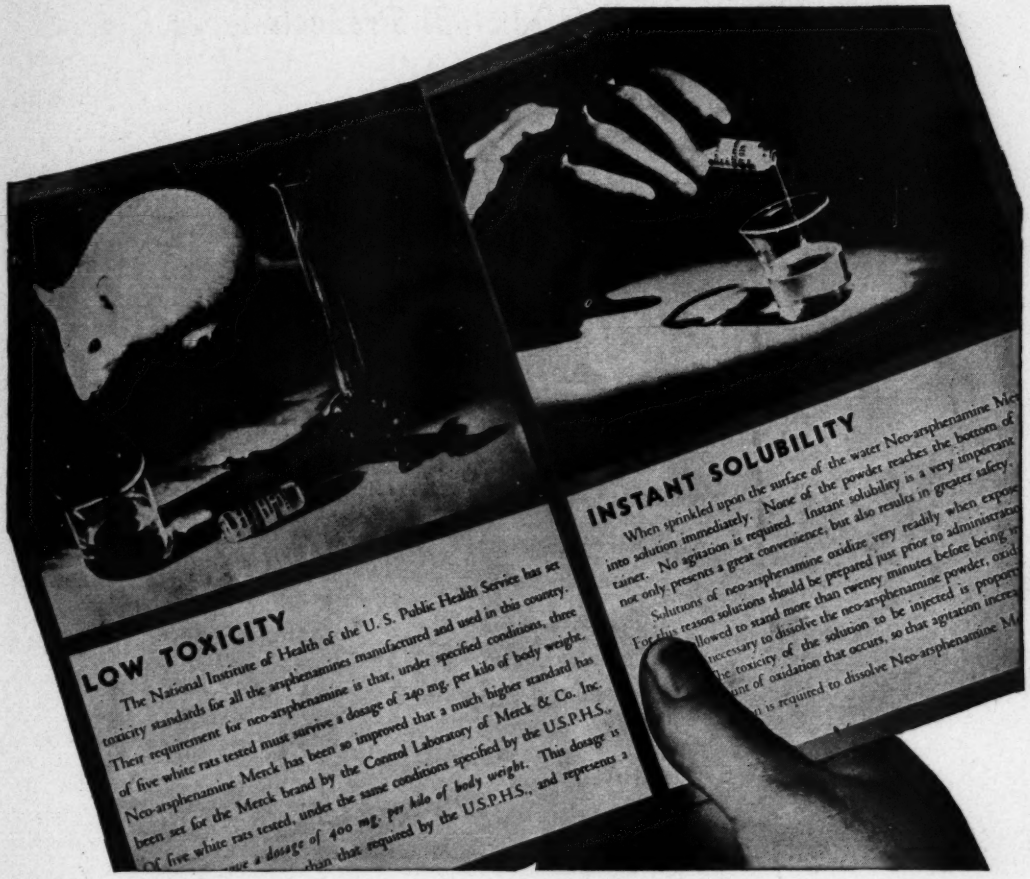
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INTRACRANIAL INJURIES OF THE NEWBORN

From the Standpoint of the General Practitioner*

P. BROOKE BLAND, M. D.

Philadelphia

INTRODUCTION:

The birth of a sound healthy baby is one of the most happy as well as one of the most fortunate events connected with motherhood.

On the other hand, the birth of a dead child or a neonatal death is almost invariably looked upon as an obstetric tragedy, though probably still more tragic is the birth of a child either hopelessly crippled or grossly deformed.

In considering injuries of the newborn in general, it may be said at the outset that damage, slight, moderate or severe, may be sustained by any structure from the dermal covering—as for example the omnipresent caput succedaneum—to the mucous lining, including in the intervening area the muscles, blood vessels, nerves, bony architecture, and the parenchymatous organs as well. It is thus observed that no tissue or structure is wholly immune.

The cutaneous envelope of the fetal body is exposed to abrasions, lacerations, and necrosis, leaving at times telltale marks of an indelible nature. In certain instances skin damage is followed by bacterial invasion and occasionally this may culminate in death.

The bony framework, from the vertex of the cranium forming the upper pole of the fetal organism, as well as those structures forming the inferior pole, may be the site of the gravest form of damage.

The vital organs within the thoracic cage, or those within the abdominal cavity, may, likewise, sustain damage of a disabling or even fatal type.

Of the various forms of fetal birth trauma, both as regards the immediate and remote results, injury of the cerebrospinal system is probably the most frequent and certainly in all respects by far the most serious.

Numerous investigators have demonstrated that pathologic conditions arising in the early days of neonatal life are largely dominated by injuries sustained by the brain during delivery.

FETAL MORTALITY IN AMERICA

In studying the statistics of fetal mortality in this country, it is exceedingly disquieting to learn that each year approximately 150,000 infants are born dead or die shortly after delivery. This means that 12,500 babies succumb every month, 2,885 every week, 410 daily, 17 every hour or approximately one every three minutes throughout the year.

In the light of modern knowledge, it is quite safe to claim that one-half or more of these fatalities follow intracranial damage. This carries the implication that there occur annually 75,000 deaths, or one every six minutes, from injuries of the structures within the cranial cap.

It is altogether likely that many deaths heretofore designated as neonatal and stillbirths, especially those ascribed to that symptomatic state, asphyxia neonatorum, really resulted from gross damage of the vital organs inside the cranial cavity.

Apart from injury of sufficient gravity to result in stillbirth or neonatal death, there remains a vast world of little children, as well as of individuals of varying age, with bodies or brains, or both, hopelessly and permanently deranged. Herein is found one of the lamentable tragedies of childbirth, for literally intracranial damage leaves in its wake an end-

*Read before the Medical Society of Delaware, Dover, October 9, 1934.

less procession of the lame, the halt, and the blind.

It is not possible to state definitely how large this group is, but it probably includes thousands—thousands of children with bodies frightfully maimed and brains partially or wholly bereft of function—thousands doomed to remain helpless babies both physically and mentally so long as they live.

According to Edgar A. Doll, it is estimated that one per cent of the total population of the United States is mentally deranged. This indicates that there are approximately 1,250,000 mentally deficient individuals in this country.

According to the author quoted, it is believed that one-half to two-thirds of these individuals, especially the institutionalized, are of the so-called hereditary or primary types. Ten per cent of the secondary types, it is claimed, are due to birth injury. This means that roughly 125,000 cases can be ascribed to injuries sustained at the time of delivery.

LITERATURE

In recent years fetal birth trauma in general and trauma of the organs within the cranium particularly has been receiving some of the attention, long overdue, it actually deserves. Numerous articles have been published dealing with the trouble and, according to Ford, one of the first important contributions was made by Wehye, 46 years ago, who recorded the autopsy findings in 959 stillborn babies. In these intracranial hemorrhage was found in 122.

Since the publication in 1888 of the observations of the author cited, an ever-growing literature has developed, though it is interesting to note that this has appeared largely during very recent years. In a series of references recorded by Ford, totalling 136, all except 49 of the articles have been contributed since 1910, and it is further interesting to observe that more than 60 of these papers appeared between 1920 and 1927.

In another series of 64 articles dealing with the subject, quoted by Doll, 48 were published since 1918.

While a few papers were contributed, one by Kennedy, in 1836, and another by Mauthner, in 1844, it was the notable article published by W. J. Little, of England, that directed special attention to the subject. This classical document was read at a meeting of the Obstetrical Society of London, on October the second, 1861, 73 years ago. It was entitled: "On the Influence of Abnormal Parturition, Difficult Labor, Premature Birth, and Asphyxia Neonatorum on the Mental and Physical Condition of the Child, Especially in Relation to Deformities." This is one of the most noteworthy contributions to scientific medicine of all time. It should be read and studied by every teacher, student, and practitioner of medicine.

In his presentation, Little also referred to what he designated as his first paper, which was published 17 years before.

The essayist probably had in mind the series of lectures—18 in all—which he delivered on Deformities of the Human Frame, at the Hospital for the Cure of Deformities, London, in the year 1844. In lecture 8 and 9, the latter especially, there is outlined a detailed description of the clinical features of spastic rigidity—now commonly called Little's disease—of muscles and deformities in infants, young children and adults.

The author attributed certain forms of spastic palsy and mental derangement to asphyxia. Apparently he did not appreciate the fact, as we do today, that asphyxia was a symptom rather than a cause of damage within the cranial cap. Little quite properly assumed that asphyxia was due to some interference with the placental circulation, and this he believed provoked the subdural and other types of intracranial hemorrhage. Although he does mention mechanical injury as a cause of spastic palsy, he evidently had no knowledge of, nor did he realize, the part played etiologically by primary obstetric damage within the fetal skull.

In his contribution he had shown that mechanical injuries of the head and neck following premature birth and difficult labor, in those instances where fetal life was preserved, though convulsions followed delivery, that the latter—convulsions—were apt to be succeeded by a determinate affection of the limbs of the child. This he designated spastic rigidity and ascribed as the cause "asphyxia neonatorum."

A feature of absorbing interest in connection with the study is found in his statement

that medical writers of the period seemingly were unaware that abnormal parturition, ending in recovery of the child, at times terminated in diseases or conditions that manifested themselves in a remote stage of life.

In closing the discussion of his paper, he stated that he was not able to find any references to birth injuries with their sequelae in the works of English medical writers. He, therefore, with confidence referred, he said, to Shakespeare and there he discovered the description of the physical deformity of King Richard the Third. This fitted precisely an individual afflicted with one kind of deformity originating at birth.

It is of interest to mention also in this connection that Sir Thomas Moore refers to the character of the birth of King Richard. His mother, the Duchess of Gloucester, Sir Thomas states, "had much ado in travail and that Richard was born with the feet forward," in other words as a breech delivery. It is pertinent to mention, also, that his birth was premature.

King Richard, in lamenting on his condition, is made in Act I by Shakespeare to say:

"But I am not shaped for sportive tricks,
Nor made to court an amorous looking-glass;
I, that am curtailed of this fair proportion,
Cheated of feature by dissembling nature,
Deformed, unfinished, sent before my time
Into this breathing world, scarce half made up,
And that so lamely and unfashionable
That dogs bark at me as I halt by them;
Why, I, in this weak time of piping peace,
Have no delight to pass away the time,
Unless to spy my shadow in the sun,
And descant on mine own deformity."

FREQUENCY

In a study of the literature regarding the frequency of intracranial injury, one naturally finds, as always, some discrepancy in the data recorded. Autopsy studies, according to Ford, disclose that the incidence ranges from 20 to 65 per cent. In certain conditions, as, for example, premature and immature babies, a much higher percentage is found and it has been determined that a varying degree of intracranial bleeding is present in 90 per cent of the cases associated with the conditions named.

This confirms the general assumption that prematurity and immaturity are very intimately related to intracranial bleeding in an etiologic way.

It may be pertinent to mention at this time that in 63 cases of spastic rigidity and allied conditions recorded in that classical contribution of Little, the obstetric maternal histories refer to prematurity or complicated labor in nearly all.

Breech presentations, as already indicated, are accompanied by a much higher percentage of gross trauma with hemorrhage inside the cranial cavity than are vertex presentations.

During the past eight years, in my own clinic, intracranial hemorrhage has been responsible, as confirmed by postmortem investigation, for 14 per cent of our stillbirths and 13 per cent of our neonatal deaths. In other words, during this time, intracranial injury with hemorrhage we found was responsible for 27 per cent of our fetal mortality.

I am persuaded, however, that these figures do not represent the total percentage of the fatal cases of intracranial hemorrhage arising in our clinic. There were others, fetal deaths which I believe were unmistakably due to intracranial damage, but in these we were denied the opportunity of conducting autopsy investigations.

Apart from those cases of intracranial trauma of sufficient gravity to result in death, there are, besides, numerous instances in which injuries of a minor extent and unassociated with symptoms occur. Hemorrhage of varying degree is found in these babies. Indeed, it has been demonstrated by Sharp and others that routine spinal paracentesis of all newborn babies will reveal the presence of certain quantities of blood in approximately ten per cent of the patients. Ford claims that a very large percentage of babies dying during delivery, or shortly thereafter, show frank evidence of intracranial hemorrhage at autopsy. This opinion is shared by nearly all present-day observers. In only about one-third of the infants affected, however, is the bleeding of such proportions as to result in death.

MORBID ANATOMY

Passing on to the question of the morbid findings in cases of intracranial trauma, two conspicuous lesions of varying intensity usually are found: First, laceration of the dura

mater septa and, second, hemorrhage. In a certain number of instances, especially in the premature, bleeding is sometimes found without meningeal damage, and, conversely, injury of rather extended proportions of the membranes with bleeding wholly absent may also occasionally be observed.

Holland, in analyzing 167 fresh fetuses, found the tentorium cerebelli lacerated in 81 or 48 per cent. Laceration of the falx cerebri was found as an accompaniment in 5 of these specimens, but in spite of the extensive trauma, bleeding was wholly absent in 6 of the bodies examined.

SITE OF INJURY

With reference to the site of injury, we learned from our investigations that this may occur in almost any section of the dura mater septa, though in most instances we, as have Holland and many others, found that the tentorium cerebelli, just below or near its union with the falx cerebri, is most frequently damaged. Laceration may involve one or both sides of the tentorium and the tear may be incomplete or complete. In a certain number of instances, as has already been mentioned, injury of the falx is an accompaniment.

The configuration of the lacerations is variable. Some appear as simple slits. Others are found elliptical in outline. Some appear as oval perforations — fenestra — and still others as irregular ragged rents.

Laceration of the septa is nearly always associated with an outpouring of blood and this may be mild, moderate, or severe. While laceration without hemorrhage occasionally occurs, this is observed only in exceptional instances. In the majority of cases, vascular damage is an accompaniment of injury of the membranes, and at times venous trunks of large dimensions are torn.

Capon, quoted by Ford, found in an autopsy study of 80 stillborn babies the source of the bleeding as follows:

First, the cerebral veins near their terminations in the superior longitudinal sinus.

Second, the internal cerebral veins, the choroidal veins particularly, and almost exclusively in premature babies.

Third, the small nameless veins coursing through the fibers of the tentorium.

Fourth, the tributaries of and occasionally the chief trunk of the vein of Galen.

Fifth, the superior longitudinal, the transverse, and the straight sinuses occasionally.

In the main, however, it is the veins of small dimensions that are involved.

Holland, from his observations, believes that the principal source of hemorrhage is from the tributaries which the vein of Galen receives from the cerebellum and midbrain and, also from the cerebellar veins which enter the straight sinus.

The quantity of blood effused is variable. It may be mild, moderate, or profuse. In cases of severe injury the brain at times becomes literally flooded with blood.

Profuse hemorrhage, however, does not seem to be absolutely essential, in order to result in a fatality. Minute hemorrhage may be culpable. Microscopic bleeding, it has been demonstrated, is sometimes responsible for stillbirths and neonatal deaths.

For example, in 53 unselected cases, Hemsath and Canavan found in their autopsy studies, especially in the region of the medulla, 34 instances—64 per cent—areas of microscopic hemorrhage. In 12 of the babies examined these findings provided the anatomical cause of death, which otherwise would have remained unsolved. The investigation carried out by the authors mentioned confirms the view of Crothers, who has pointed out that damage of the medulla is the predominate factor in birth trauma.

MECHANISMS

Injury of the dura mater septa together with the vessels is brought about by intracranial stress and its mechanism, as described by Holland, is rather widely accepted. Intracranial stress is defined as a compound compressive stress which roughly may be regarded as consisting of two elements: first, a general compression of the whole brain and, second, a simple longitudinal compression by opposite forces acting at the ends of the long diameter of engagement of the head in the pelvis. With these forces operative, there is brought about alteration in the contour of the fetal head, together with overstretching of the septa of the dura mater (Holland).

For instance, in vertex cases and in the aftercoming head in breech presentations, the

anteroposterior diameter of the head is decreased, while the vertical diameter is increased. This alteration results in overstretching with attentuation of the falx, particularly at or near its point of junction with the tentorium, and it is in this region that gross damage most frequently takes place.

In face and brow presentations, there is a decrease of the vertical with an increase in the anteroposterior diameter of the head and this naturally brings about elongation and stretching in the lower free borders of the tentorium and falx. Hyper-attentuation in these circumstances must inevitably result in lacerations with fatal termination in a certain number of instances, and to a degree hitherto wholly unsuspected.

PREDISPOSING FACTORS

The consideration of the etiology of intracranial damage would be wholly incomplete without some reference to the factors chiefly concerned in a predisposing way.

These briefly may be summarized as follows:

First, it has been demonstrated that parity is influential in a certain number of instances, because it has been observed that the accident is considerably more frequent in the first than in subsequent labors and this is especially true with the birth of male children.

Second, intracranial damage, it has been found, is prone to occur in prolonged and difficult labor, as is encountered in contracted pelves with delivery occurring either spontaneously or otherwise.

In this connection it should be mentioned parenthetically that judicious instrumental delivery seems to be far less likely to be followed by intracranial damage than in unwisely governed spontaneous labor. It is the long, unduly drawn-out stress of spontaneous and not the relatively short stress of forceps delivery that is most likely to inflict damage of a serious character intracranially.

Third, predisposition naturally is favored in technically difficult and imprudent forceps delivery.

Fourth, it has been found that in complicated breech delivery, especially in cases associated with hasty, unskilled extraction of the after-coming head that damage is especially likely to occur. This method of delivery is regarded as accountable in a large number of instances of brain injury. (In the 168 fetuses examined by Holland, breech delivery was held as causative of intracranial damage in 47. In this series, laceration of the tentorium cerebelli was found in 37 cases, or in approximately 75 per cent.)

Fifth, the lesion is also far more frequent in premature and immature infants, due, first, to the fragility of the blood vessels, and, second, to incomplete anatomical development of the strengthening fibers of the tentorium. Prematurity and immaturity must, therefore, be looked upon etiologically as among the chief predisposing factors.

Sixth, in difficult delivery of the after-coming head following version. This is operative, it has been found, in a large number of instances and, hence, accounts for a certain number of cases in a predisposing way.

Seventh, the indiscriminate use combined with excessive dosage of pituitrin to stimulate uterine contractions in the second stage of labor has been a rather potent source of damage of the brain and its enveloping membranes in a definite number of cases.

Eighth, biochemical changes in the blood, as well as constitutional disease, syphilis for example, have been mentioned as predisposing, but these conditions are by most observers not credited with special etiologic importance. However, it seems reasonable to assume that a hemorrhagic tendency verging on the pathological may become a factor of predisposition in some cases.

As a matter of record and interest, the recital of some personal observations made in my own clinic as regards operative delivery might not be amiss at this time.

In 4,631 consecutive deliveries there occurred 49 fatal cases of intracranial hemorrhage, a fetal mortality from this source of about one per cent.

The character of labor in relation to the fetal mortality is portrayed in the following table:

Total Number, With Character of Cases Delivered		Number of Cases of Intracranial Hemorrhage	Fetal Mortality
Spontaneous	4020	14	.3 per cent
Forceps	382	13	3.4 per cent
Breech	174	11	6.3 per cent
Version	55	11	20 per cent

For fear of consuming more than the usual

period of time allotted for this presentation and trespassing thereby on the time set aside for general discussion of the topic, it is obviously not possible to consider many other intimate and important features of the problem.

With reference to the symptomatology and diagnosis, I can only in a very brief way mention that intracranial damage is characterized by a rather sharply defined clinical portrait, delineated by an apathetic listlessness; perturbed respiratory function; cyanosis varying in intensity and duration; nystagmus, especially in severe cases, of an impressive and arresting type; a firm, tense, bulging large fontanel; convulsive seizures of the Jacksonian type, flaccid palsy in the muscles affected with convulsive seizures; indifference or refusal to nurse; an appealing, plaintive cry; dysphagia (20 per cent); and a varying degree of fever.

With a clinical profile so typical, especially one combined with a history of primiparity, a large male child and a tedius, difficult delivery, spontaneous or instrumental, the diagnosis should be made forthwith. Indeed, with symptoms of the mildest sort, or no symptoms at all, following a difficult, complicated delivery, the possibility of intracranial injury should always be called to mind. Confirmation of one's suspicions in a rather clinically clear type of case, or in one of a suspected nature, is readily made by spinal puncture.

With reference to the remote sequelae of intracranial damage, with or without hemorrhage, I feel it incumbent to once more follow the dictates of brevity and simply say that gross injury of the delicate structures within the fetal skull, unless successfuly counteracted, inevitably leads to cell destruction with altered function, both physical and mental, of a permanent character.

Notwithstanding the observation that there is still some controversy as to the etiological relationship of birth trauma—intracranial injury—to various neuropsychiatric states, including the spastic paralyses in children with or without amentia, it is, nevertheless, most significant that in all or nearly all children illy organized one finds, in a large number of instances, a history of prematurity or difficult labor, or both.

In the literature dealing with the spastic paralyses of children, there are mentioned generally three etiological factors: (1) maldevelopment of the neurones; (2) inflammatory processes as found in encephalitis; and (3) most conspicuous of all, destruction of the neurones from minor or gross hemorrhage.

It seems clear that severe injury is quite capable of bringing about sequelae of a serious nature.

Doll claims that all possibilities considered, the following position in regard to birth injury seems justifiable:

"1. While it is at present difficult to reach any conclusions as to the actual percentage of children with neurological and mental handicaps who owe their defects to injury at birth, it yet seems generally agreed and reasonable that some children do survive cerebral hemorrhage and carry through life the marks in varying degrees of neurological disorder and mental retardation.

"2. That such cases are probably more frequent than has been realized heretofore is the trend of the most recent and authoritative investigators. This is because of the tendency of the early physical symptoms to clear up and be forgotten, and when the defective development is observed at six or seven months of age, it is often assigned to some other cause.

"3. It appears reasonable and probable that cerebral hemorrhage of degrees insufficient to cause death and even insufficient to permit detection in the early behavior of the infant, due to lack of development of the cortical cells at that time, are yet sufficient to obstruct normal development and show in later deficiency.

"4. While the motor disturbances, particularly spastic paralysis, are unquestionably the direct result of the hemorrhage in these cases, there is yet room for question in any particular instance, whether the mental retardation is directly related to a widespread process of cell destruction which also caused the paralysis, or whether the mental deficiency is caused by the restrictions in ideational expressions which the paralysis imposes.

"5. It does not appear unlikely that injury which does not affect the motor areas may simulate other forms of cerebral deficiency

and be mistaken for primary amentia of any degree from moronity to idiocy.

"6. Birth hemorrhage may now and then be responsible for hydrocephalus, though this is probably rare.

"7. Secondary epilepsy may be one of the results of cerebral hemorrhage. (Stratling states, "that the old lesions of an infantile cerebral hemiplegia are among the most frequent found in the brains of epileptics and further: we are reasonably safe in saying that fully 40 per cent of all the cerebral hemiplegics of infancy ultimately become epileptic.")

"8. It is more than likely that a cortical hemorrhage which does not affect the motor centers may be responsible for personality deviations, especially noticeable in distractibility and irritability."

MANAGEMENT

Passing on to the therapeutic management of intracranial injury as encountered in everyday practice, the most dependable of all measures is prevention, and this may be summarized as follows:

1. Scrupulous antenatal supervision with the view of recognizing and eliminating complicating conditions which may lead to serious difficulty at the time of labor, recalling in this regard the age-old axiom, "to be forwarned is to be forearmed."

2. The avoidance of undue intracranial stress from the imprudent use of oxytocics, as for example pituitrin.

3. The evasion whenever possible of all difficult manual and instrumental deliveries and the performance, in all threatening cases, of elective abdominal delivery instead.

4. The avoidance in all cases of hasty, antiquated manual means in the extraction of the after-coming head in breech cases.

5. The routine employment of the Piper forceps in the delivery of the after-coming head in all difficult breech deliveries, and in the extraction of the after-coming head following the operation of version.

6. The stimulation of respiratory function by the administration of carbon dioxide and oxygen in all newborn babies showing signs of respiratory embarrassment.

7. The regular practice of cisternal or spinal paracentesis in infants subjected to undue cranial stress is prolonged, difficult, and complicated labor.

8. The repetition of cisternal or spinal paracentesis once, twice, or even thrice daily —by trained hands—in all infants showing free blood in the spinal fluid.

9. The intra-gluteal or intra-peritoneal injection of human blood—10 to 20 cc—in all newborn babies displaying symptoms and signs of intracranial trauma with hemorrhage.

10. The maintenance of fluid balance by the hypodermoclytic administration of saline solution with glucose—5 per cent—in quantities of 20 c. c. repeated every 4 or 6 hours.

As a means of emphasizing the importance of prophylaxis in the therapeutic management of intracranial damage of the fetus, may I finally direct attention to the phenomenal achievements which have followed the institution of preventive resources in certain types of organic disease.

In tuberculosis, for instance, the attainments have been almost unbelievable, and only recently a renowned authority, Doctor Lawrence F. Flick, stated that within the short span of 20 years tuberculosis will be unknown in the city of Philadelphia. This, of course, applies to the country as a whole.

Unhappily, thus far no concerted or effective efforts have been made to overcome the frightful mortality and still worse the harrowing disability resulting from injuries of the fetal brain of the newborn, although gross damage of the fetal cranium with its contents is far more amenable to preventive means than is bacillary infection of the lungs.

When this gradually growing conviction becomes widely known, and prophylactic methods become thereby more zealously practiced, would it not be logical to assume that grave intracranial injuries of our posterity would likewise become if not wholly eliminated, almost unknown? "'Tis a consummation devoutly to be wished."

INFANT NUTRITION

With Reference to Lemon Juice Feeding*

JOHN B. BAKER, M. D.
Milford, Del.

To quote Holt and McIntosh[1], "nutrition in its broadest sense is the most important

*Read before the Medical Society of Delaware, Dover, October 9, 1934.

branch of pediatrics. Thus it is absolutely essential that we have a knowledge of its fundamental principles, if we are to apply preventive and corrective measures intelligently."

Our best guide as to the adequacy of nutrition is the character of growth. Each infant must be handled as an individual and treated as such, because there is a great variation in the growth and development, depending upon the race and the family to which the child belongs, some children tending to be large while others are small. Therefore average figures for weight and measurement should be taken as a guide and not as a standard.

Tyson[4] says "the old idea of infant feeding was a rather hit-and-miss affair, with many trials and many errors." Today we try to avoid any "hit-and-miss" method and base our feeding on definite, known requirements.

These known requirements for which we must supply enough calories are[2]:

(1) the basal or maintenance metabolism
(2) the growth needs
(3) the needs for muscular activity
(4) the food value lost in the excreta

Different workers give slightly varying figures for the average needs. Faber[5] lists them as follows:

(1) for basal metabolism, 45 to 50 calories per kilo of body weight.
(2) for growth needs, 40 to 20 calories
(3) for general muscular activity, 20 to 30 calories
(4) for work of digestion, 4 to 6 calories
(5) for loss as excreta, 8 to 12 calories

For our purpose it is suffice to state that the young infant needs about 55 calories per pound of body weight, while older infants need about 45 calories per pound of body weight. Thus we see it is the calculation of the number of calories which the infant receives that tells us whether the infant is being over or underfed. Thus in trying to arrive at the amount of food needed, we first calculate the amount needed for average weight and age of the infant.

An adequate diet must contain the basic elements of protein, fat, carbohydrate, mineral, water, and vitamins.

Proteins are essential to body growth and repair. All proteins do not have the same value in nutrition because some proteins do not contain the essential amino acids. Therefore the amount of protein needed by the individual depends on the character of the protein.

If breast milk is given the protein requirement is 25 gm. of protein per kilo[6]. This is because breast milk contains lactalbumin, which is a complete protein. Cow's milk protein is mostly casein, which is poor in amino acids, especially cystine. Thus infants fed on cow's milk should receive 3 gm. of protein per kilo[6].

When insufficient proteins are fed[7] the infant is retarded in growth, the circulation is poor, the musculature becomes flabby, there is an increased susceptibility to infection, and at times an anemia. At other times there is a nutritional edema. If too much protein is fed there occurs an increased secretion of alkaline intestinal juices, and the stools become constipated.

A certain amount of carbohydrate is necessary for the maintenance of life. The minium amount is 3 grams per kilo of body weight, or 0.05 oz. per lb. The optimum amount is 8-14 grams per kilo of body weight of 0.13 to 0.22 oz. per lb. Carbohydrates supply, therefore, not only the necessary calories not furnished by protein and fat but they are also necessary to complete the oxidation of fats.

Under normal conditions carbohydrates are absorbed only as monosaccharides. The conversion of carbohydrates to monosaccharides occurs in the intestine. After absorption monosaccharides are built into glycogen, which is stored in the liver and muscle if not needed for energy requirement; any excess of carbohydrate may be converted into fat.

Too high a carbohydrate content may lead to a diarrhea, although this is not always true. If too much carbohydrate is fed, as in condensed milk feedings, the infants are flabby, often develop rickets, and have very little resistance to infection. The deficiency of protein and fat in this feeding is probably just as important as overfeeding with the carbohydrate.

Lactose[8] would seem to have a theoretical advantage over the other sugars, but it does not. One advantage is that it is not so sweet as other sugars or karo. It reaches the lower

part of the intestinal tract and occasionally exercises a more laxative affect.

Cane sugar is used widely. It is fermented by yeast. It is not as laxative as lactose. It has the disadvantage of being very sweet.

Dextrin is not fermented by most intestinal bacteria; it is easily converted into maltose, but the conversion does not appear to take place more rapidly than the maltose can be absorbed and digested. Karo is a mixture of dextrins, or dextrose and maltose. Mixed sugars have the advantage that a large amount may be fed without danger of diarrhea.

Fats are the most important source of animal heat, the normal breast fed infant receiving about one-half of his calories in this form. In bottle fed babies this amount of fat is neither necessary nor desirable. Von Groer[9], in Vienna, attempted to rear infants upon a fat free diet. He found it practically impossible, as the fat was needed to carry the fat soluble vitamin. Before fat can be absorbed from the intestinal tract it must be saponified[10]. It is absorbed as fatty acids and glycerine. It reunites, after passing through the intestinal wall, to form neutral fat.

The amount of fat used depends upon the state of nutrition and the amount of other food fed. A certain amount of carbohydrate should be present to help metabolize the fat. Due to its high caloric value fat serves well to make up the energy requirements.

The vitamins A and D are associated with the fat of milk. A diet poor in fat leads to vitamin deficiency, and causes the protein and carbohydrate to be increased to provide the necessary calories. Excessive fat depresses the appetite, impairs gastric secretion and motility, and increases the tone of the pyloric sphincter.

In addition to protein, fat, and carbohydrate, mineral matter is essential to the diet of the infant.

They are the chief constituents of the body fluids and cells, play an important part in the growth of bones, and furnish material from which the mineral part of the blood and digestive tissues are formed.

Potter[11] states that the most important salts are chlorides, phosphates, and the combinations of sodium, potassium, calcium, magnesium and iron. Sodium and chlorine are the chief constituents of the body fluids. They are absorbed from the intestines and only a small amount is found in the stool. Any excess in the body is excreted in the urine. Their chief functions are to maintain osmotic pressure and to give minerals to form the gastric and intestinal juices.

Potassium is the chief constituent of body cells. There is enough potassium in both human milk and in cow's milk to meet the requirement of the infant. Thus it is not necessary to administer added potassium.

Calcium is essential to maintain the proper growth of bones and to prevent tetany. The amount of calcium absorbed and retained in the blood or deposited in the bones is influenced largely by the amount of antirachitic or D vitamin in the diet. Either 2.5 oz. of human milk or 1.5 oz. of cow's milk per pound of expected body weight furnishes enough calcium for the normal requirement.

Magnesium is present in small quantities in bones, muscles, and blood serum.

Iron forms the essential part of the hemoglobin molecule. Holt[12] states that after the seventh month it is advisable to give iron to help prevent anemia.

Copper, the exact function of which is not yet determined, seems to have a catalytic action upon the synthesis of hemoglobin.

Phosphorus is an important part of the body cell and is abundant in nerve tissue. Inorganic phosphates are the chief mineral constituents of bone. Acidity favors the absorption of phosphorus, as does vitamin D and ultra-violet light.

Sulphur is present in a number of tissues. Glutathione is present in nearly all tissue in small amounts, and plays a part in physiological oxidations.

Water makes up 80 to 90 per cent of the diet. It is needed for the solution of certain parts of food[11] and for the suspension of proteins and the emulsification of fats. The water requirement is considerably influenced by the food. The optimum requirement is 125 to 150 cc. of water per kilo of body weight each day, or 2 to 2¼ ounces per pound of body weight per day. This provides a liberal margin of safety and infants may tolerate warm weather and attacks of febrile disease.

Retention of water is influenced by the administration of salt. Sodium salt aids the retention of water, and calcium and potassium have the effect of withdrawing it. Symptoms of acute dehydration—fever, prostration and loss of weight—appear when the water intake drops to one-half or one ounce per pound of body weight. There is no advantage in increasing the water intake over the value stated, as it merely causes an increased flow of urine.

Vitamin A[3] is present only in fats, being the most abundant in milk. A deficiency of vitamin A causes malnutrition and lowered resistance to infection, the eyes have a conjunctivitis with softening and ulceration of the cornea.

Vitamin B, a water soluble vitamin, is abundant in brewer's yeast. The absence of vitamin B leads to polyneuritis. It is thought by some observers that loss of appetite and malnutrition are vitamin B deficiencies.

Vitamin C is the antiscorbutic factor. It occurs in citrus fruits, particularly in orange and lemon juice. Tomato juice and cabbage also contain it. Milk dried in vacuo contains practically all its vitamin A but little Vitamin C. Orange juice may be started early, using a small amount in the beginning and gradually increasing the amount until sufficient is being given.

Vitamin D is the antirachitic factor and is fat soluble. Vitamin D is not always essential as we can expose the body to sunlight or to ultra-violet light from some other source. Ultra-violet radiation of the skin activates the ergosterol in the skin, thus producing the antirachitic effect. The infant's need of vitamin D is quite generally recognized. Often viosterol is started as early as the second week after birth. In one institution it is started a few days after birth in some babies. Cod liver oil is one of the best sources of vitamin D and in addition, vitamin A. Viosterol is an irradiated oil and supplies vitamin D only.

I believe all pediatricians and practitioners interested in infant nutrition will agree that the milk of the mother is the best for the offspring. It is the natural and ideal method for feeding the infant. The White House Conference[13] reports that breast milk must be considered better than the best artificial food for the first few months of life. Breast milk is more readily digested, contains fewer bacteria, and it avoids certain economic and social difficulties. However, there are many occasions on which one must feed the infant artificially. Thus we may choose the feeding best suited. Whenever possible, cow's milk is employed.

All milk should be boiled unless it comes from a certified dairy. Herd milk is more nearly constant in composition and should be fed in preference to milk from a single cow. One of the problems we meet here is that our milk supply is not reliable, especially on the farms. I mean by this that we cannot be sure of its composition, as in one family the milk may come from a Jersey cow, while at another farm the milk comes from a Holstein cow, while at another it may come from just plain cow. Often the cattle are not tuberculin tested, especially on the smaller farm. One of our local veterinarians has informed me that undulant fever is common in many herds. Frequently the children have gastro-intestinal upsets from drinking the milk from a cow newly turned on pasture. Also, I have seen several cases where children had gastro-intestinal upsets from drinking the milk of cows newly fresh.

I believe that the majority of the milk obtained from our local dairies in our small towns is adequate for infant feeding. However, lately, for some of the reasons stated above, I have been using evaporated milk in infant feeding and also because its fat is homogenized, its curds are softer and smaller, and it is easy to digest.

The minimum amount of whole cow's milk to be fed is 1½ oz. with an optimum of 2 oz. per pound of expected body weight and from ¾ to 1 oz. of evaporated milk to the pound of expected body weight, and with 1/10 oz. of carbohydrate per pound per day. In the early period of infancy, the first two months, 7 feedings daily with a 3-hour feeding interval during the day and a 4-hour interval during the night, will meet the need. Some men prefer to carry this time arrangement through the third month. Often, however, the child will drop the 2 A. M., feeding by the time it is two months and sleep through the

GROUP I—DIARRHEA

Whole Milk and Lemon Juice

Name	Birthday		Start		End		Gain
J. M.	6/ 4/33	9 lb. 2 oz.	10/ 1	10 lb. 8 oz.	1/ 5/34	16 lb. 10 oz.	6 lb. 2 oz.
B. J.	5/14/34	7 lb. 8 oz.	6/25	8 lb. 13 oz.	10/ 4	14 lb. 2 oz.	5 lb. 8 oz.
Hay.	3/10/34	7 lb. 8 oz.	6/23	10 lb. 12 oz.	9/22	16 lb. 6 oz.	5 lb. 10 oz.
C. A.	6/15/33	8 lb.	10/12	10 lb. 14 oz.	12/ 2	15 lb.	4 lb. 2 oz.
TTH	2/23/34	10 lb. 4 oz.	2/23	10 lb. 4 oz.	6/22	15 lb. 11 oz.	5 lb. 7 oz.

GROUP II—DIARRHEA

Evaporated Milk and Lemon Juice

E. A.	8/ 1	7 lb. 7 oz.	8/12	9 lb. 8 oz.	1/24/34	15 lb.	5 lb. 8 oz.
E. M.	3/10	7 lb. 7 oz.	5/26	10 lb.	8/29	14 lb. 13 oz.	4 lb. 13 oz.

GROUP III—WELL

Evaporated Milk and Lemon Juice

V. R.	6/ 7/34	8 lb.	7/25	9 lb.	9/27/34	12 lb. 5 oz.	3 lb. 5 oz.
C. C.	5/15/34		6/28	8 lb. 11 oz.	9/27/34	14 lb. 14 oz.	5 lb. 13 oz.
W. K.	7/ 7/34	8 lb. 12 oz.	8/ 3	9 lb. 13 oz.	10/ 4/34	13 lb.	3 lb. 6 oz.
W. B.	12/ 8/33	5 lb. 14 oz.	1/ 8/34	7 lb. 13 oz.	4/11/34	15 lb. 8 oz.	7 lb. 11 oz.

GROUP IV—WELL

Whole Milk and Lemon Juice

A. M.	5/28/33		8/12	9 lb. 9½ oz.	11/16/33	16 lb. 8 oz.	7 lb. 15 oz.
V. W.	5/12/33		10/30	15 lb. 12 oz.	1/ 8/34	19 lb. 1 oz.	3 lb. 5 oz.
H. H.	2/14/34		3/30/34	9 lb. 8 oz.	6/18/34	15 lb. 15 oz.	6 lb. 7 oz.

night, thus getting only 6 feedings during the 24 hours.

As to the quantity of food to be given at a feeding, if we add 2 oz. to the age in months, this will give us a sufficient volume up to the age of 6 months. After the baby reaches 6 months, the volume is usually kept the same, with 8 oz. at a feeding being the greatest total amount ever offered the infant. Tyson places emphasis on the need of progressing slowly in feeding the newborn. Overfeeding is likely to cause indigestion.

Orange juice should be started about the 4th to the 6th week.

Vitamin D may be supplied by means of viosterol, and is started when the baby is one to two weeks old. Later cod liver oil may be used, starting with a small amount in order to get the baby used to the taste, and then gradually increase the amount until the infant receives one dram three times a day.

Sufficient mineral is usually supplied by the milk, iron being the only one lacking. Thus, after the baby is five months it should receive a little green vegetables to help meet this need and in order to avoid a nutritional anemia.

Milk is modified to make it more digestible and to secure a more flocculent curd. The addition of water, lime water, lactic acid, lemon juice or other acid accomplishes this end.

Acids and acid fruit juices have been further used to modify milk. This leads to the neutralization of the buffer substance. Thus the milk is more readily digested and finer curds result. Acidification favors the normal functioning of the pyloric sphincter and stimulates the flow of bile, pancreatic juice, and intestinal juice. Also, it supposedly aids the absorption of calcium. Another advantage is that the acid inhibits bacterial growth, thus milk keeps better where there is poor refrigeration. The milk may be fed in a more concentrated form, and is especially suited to undernourished infants having a large digestive capacity.

Lactic acid is recognized as the acid of choice. It is used in the proportion of 4 drops of lactic acid to each ounce of milk. Lactic acid curdles milk and is difficult to prepare. Many mothers give it up and will not use it. Even if prepared successfully, if on warming the milk it is heated too much, more curdling results, necessitating larger holes in the nipple.

Lemon juice is a good substitute for lactic acid. Lemon juice formulas, on the whole, are easier to prepare. In the proportion used it seldom causes curdling, yet it renders the milk more digestible. The curds that are formed are very fine. It is more palatable than lactic acid formulas. It supplies the antiscorbutic vitamin C, thus the failure to sup-

ply orange juice or tomato juice is to a degree mitigated.

Hess[14] states that if 21 cc. of lemon juice is added to a quart of milk, its buffer action is markedly reduced and the hydrogen iron concentration is increased from pH 6.6 to about pH 5.54.

Reiss[15] reports a series of cases fed lemon juice-evaporated milk formulas. He noted no difference in appetite, but the incidence of gastro-intestinal upsets was less in the lemon juice-evaporated milk group. If the infants tended to vomit on a concentrated evaporated milk-lemon juice feeding this was quickly diluted, thus remedying the formula. He noted no scurvy in either his lemon juice group or his control group. The nutritional state as measured by the weight, tissue turgor, muscle tone, developmental progress, and response to environmental stimuli was excellent in both groups.

In a group of 240 cases half of which were fed lemon juice—evaporated milk and the other half were fed simple formula the food was well taken, there was uniform gain in weight, vomiting was a rare incidence, and the stools were normal.

The following are a few cases presented merely to show the response that the babies will make when fed formulas to which lemon juice has been added.

The first few cases are ones which had a severe diarrhea and as soon as this was under control were placed on whole milk and lemon juice. In each case the response was good, with the babies taking the formula well and gaining weight. The least amount gained in a 3-month period was 5 lbs. 8 oz., the greatest amount gained was 6 lbs. 2 oz.

The two cases presented as Group II were more severe diarrheas. They were fed evaporated milk and lemon juice. Baby E. A. had a very stormy time, but later responded and gained 5 lb. 8 oz. in four months. Case E. M. was not quite so severe; she gained 4 lb. 13 oz. in four months.

Group III shows 4 babies fed lemon juice-evaporated milk formula. Two were watched every week for two months. These two gained 3 lb. 5 oz. and 3 lb. 6 oz. respectively. Cases C. C. and W. B. were watched weekly for three months. Case C. C. gained 5 lb. 13 oz., and Case W. B. gained 7 lb. 11 oz.

Group IV shows 3 cases fed whole milk and lemon juice. Case A. M. was 5 months old when first seen. She gained 7 lb. 15½ oz. after being placed on a formula. The baby was seen regularly and co-operation on the part of the mother was excellent. Case V. W. was also 5 months when first seen and weighed 15¾ lbs. She gained 3 lb. 5 oz. in 13 weeks. Case H. H. was 6 weeks old when first seen and was seen regularly every week. At the end of a three-month period he had gained 6 lb. 2 oz.

To attempt to draw definite conclusions from such a small group of cases of course would be futile, but they are typical and show what may be expected when feeding lemon juice formula to both well and convalescing babies. Gastro-intestinal upsets were few; failures to gain weight on the formula were few. All the infants showed a decided gain in weight. None showed any sign of lack of vitamin C. All in all, I believe lemon juice is suitable where an acid modification of milk is desired, and that the majority of mothers will co-operate and can make up these formula without any great difficulty.

DISCUSSION

DR. G. B. PEARSON (Newark): I would like to ask Dr. Baker: In feeding lemon juice, is it a substitute for orange juice? Also, is it the citric acid or the vitamin "C" that causes the rapid gain in weight in sick and normal children?

DR. C. E. WAGNER (Wilmington): I wish to compliment Dr. Baker upon his excellent presentation. He certainly has covered the ground well.

My feeling has always been that it is well to employ as simple a feeding as possible in the case of the majority of infants, but in certain selected cases the lemon juice method of feeding is excellent and really proves superior to some of the other types of acidification of milk.

DR. JOHN B. BAKER: In response to Dr. Pearson's question, I have never fed lemon juice formulas with the intent and purpose of substituting the lemon juice directly for the orange juice, although Hess and Reiss

(Continued on Page 312)

EDITORIAL

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W. EDWIN BIRD, M. D.....EDITOR
Du Pont Building, Wilmington, Del.

WILLIAM H. SPEER, M. D.....Associate Editor
917 Washington St., Wilmington, Del.

M. A. TABUMIANZ, M. D.....Associate Editor & Bus. Mgr.
Du Pont Building, Wilmington, Del.
Telephone, Wilmington, 4368

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Local news of possible interest to the medical profession, notes on removals, changes in address, births, deaths and weddings will be gratefully received.

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VOL. VII JANUARY, 1935 No. 1

A BILL TO KILL

The legislature of Delaware, as of many other states, is now in session. That bills will be offered here that will seriously affect the medical profession is scarcely to be doubted. Should such proposals not originate in this state they will be presented by the ever-active foundations and associations in other states whose chief purpose seems to be to put over some form of compulsory health insurance. Most of these schemes are sponsored by non-medical persons whose intimate knowledge of the intricacies involved in medical practice is open to serious question. The motives of some of these persons are of the highest altruism, but these are in the minority; the majority of them are professional propagandists generously paid to tell the public—and the profession—exactly what it needs.

Among the foundations promoting compulsory health insurance are the Julius Rosenwald Fund, with a capital of $13,700,000; the Milbank Fund, with $10,700,000; the Pollak Foundation, with $3,000,000; and the Twentieth Century Fund, with $2,500,000; in other words, $30,000,000 is working night and day to accomplish their objective. Allied to these foundations—and with a certain overlapping of personnel—are sundry associations, chiefly the American Association for Social Security, the American Association for Labor Legislation, the Medical League for Socialized Medicine, and others. In the offing is the National Advisory Council on Radio in Education, sponsoring a series of nineteen radio broadcasts on medical economics, the majority of whose speakers are rated as favoring compulsory health insurance.

Out of this welter of proponents has come a so-called "Model Bill," bearing the imprint of the American Association for Social Security, and entitled: "An Act to Provide for the Establishment and Administration of a System of Health Insurance." The officers of this Association include Miss Jane Addams, Bishop Francis J. McConnell, Messrs. Alfred I. du Pont, Glenn Frank, John A. Lapp, I. M. Rubinow and Herbert S. Bigelow, with Mr. Abraham Epstein as executive secretary.

Of this bill, Dr. Francis A. Faught, chairman of the Commission on Medical Economics of the Philadelphia County Medical Society, says in the *Weekly Roster and Medical Digest*, December 1, 1934:

> This Bill contains all the unsatisfactory features of the European types of health insurance bills, including the dole. The inclusion of this feature together with compulsory health insurance is now recognized as unsafe and unsatisfactory in England. The Bill provides for a complete State political set-up, in which all the appointees, from the health insurance commission down are appointed and subject to dismissal by the Governor. Medical representation is restricted to one physician, who shall be a member of the Health Insurance Commission. The opportunity of a single physician in a commission of five, four of whom are lay persons, to control the situation is impossible.
>
> The only provision relating to the compensation of those supplying medical service under the Bill is a provision under the heading of "local advisory committees" with a lay personnel to fix the manner and make arrangements for

remunerating general medical and dental practitioners, surgeons, etc.

Participation is compulsory for all persons employed for hire "except any person employed at other than manual labor, receiving wages in excess of $250 per month." This is $3,000 per year, and will absorb at least 80 per cent of all wage earners in the United States, since it has been shown that before the advent of this depression the average annual income of 78 per cent of the population was $2,200 or less.

Cash benefits amount to 50 per cent of the employe's full time daily wage after the first five days, and for a period of 180 days in any year. Cash benefits also extend to the dependent wife and children. Maternity benefits are provided for a duration of 12 weeks.

Medical benefits in the same income group extend after a period of six months and are available to not only the employe but his wife, all dependent children, and other dependents living in the same household.

Extent of benefits—medical services of general practitioner at home or in office, hospital and general nursing care, prenatal and maternity care at home or in hospital, surgeons' and specialists' services at office, hospital or elsewhere; the services of laboratories and clinics, and limited dental care, for a duration of 26 weeks.

Additional medical benefits include drugs, medicines, and medical and surgical supplies; nursing service outside hospital, institutional care for convalescents, medical and surgical supplies such as artificial limbs, eyeglasses, trusses, etc., dental restorative work, and the services of dental specialists.

All persons in this income group cease to be beneficiaries after a limited time following the loss of employment.

There is in addition a voluntary insurance provision, which permits all persons whose income amounts to $5,000 a year or less, from any source, and under 65 years of age, upon passing a health examination, to secure sickness insurance and medical benefits as provided above, upon the payment of 4½ per cent of his annual income.

It is obvious that if such a bill should pass any State Legislature, all medical practice with the exception of about 5 per cent, representing persons with large incomes, would be confiscated by the State, so that any of you who should refuse to accept the call to enroll and supply medical service under this Bill would have about 5 per cent of the population on which to practice medicine.

Obviously, the medical profession must oppose any such bill as this on the floor of the legislature, in the homes of our patients, in public gatherings, in the press, on the radio—wherever and whenever the opportunity is presented. This calls for unity in the profession of the 100 per cent variety—nothing else can combat the $30,000,000 combine that is behind this bill. The Legislative Committee of the Medical Society of Delaware is capable, experienced, and active, and to them we look as our first line of defense. The moment this bill, or any modification of it, appears at Dover the call to arms will have sounded; a united and determined profession will be the answer to that call, and the battle cry will be: "Kill This Bill!"

In this issue THE JOURNAL prints the 1935 Directory. That it contains some errors is probable. We shall thank any officer or member of any of the societies listed to send us their corrections.

Due to some changes in the personnel of the Delaware Tumor Clinics we regret we have been obliged to discontinue the series of articles which were inaugurated last year under the title: Cancer Comment.

The State Board Examination for December has come and gone, leaving in its trail four who passed and five who failed. We congratulate the Board on the fairness of its examination—it refutes completely the charge of a Philadelphia newspaper that our policy was Delaware for Delawareans only.

That aspirin-coca cola "cocktail" hubbub died a natural death. Flaring up as something new here, we remember the drug clerks talking about it at least five years ago—their usual comment was: "Baloney!"

And so, to bed—wishing you a Happy New Year, to say nothing of a Healthy New Year, and above all a Prosperous New Year.

WOMAN'S AUXILIARY: M. S. of D.

This is the first of the four News Letters which will be sent out to the presidents, presidents-elect, and press and publicity chairmen of the auxiliaries to the State medical societies. In addition, copies will be sent to the past presidents of the National Auxiliary and to the members of the Board of Directors of the National Auxiliary. It would give us great pleasure to be able to put the News Letters into the hands of every member who wished to have a copy, but a limited budget makes this impossible. It has been suggested however, that there may be some members who would like to contribute a dolar to the sum set aside for this department. These contributors would then receive the News Letter four times a year. Another suggestion

for increasing the circulation of the News Letter is that State press and publicity chairmen have copies struck off from the one received from this committee and distribute these among the county groups.

The object of the News Letter is to pass from one group to another news of interest, and suggestions for new activity. This interchange of ideas and information is stimulating because from it evolves a feeling of friendliness between the different sections of the country—a feeling of friendliness which comes from the realization of our common problems. The News Letter cannot, of course, be valuable from the standpoint of literature, but it can be valuable as a distributor of news. You can contribute to its value and usefulness by sending in any bits of news you think might be of interest to others. With every reader a contributor, this News Letter will become a "Round Robin" in a very true sense.

It was decided that the "First Twelve Years" along with the printed reports of the Cleveland meeting be put in the hands of the Supplies Committee for distribution. This committee was authorized to print a new edition of 500 copies of the HANDBOOK. This book, compiled by women of vast experience in our Auxiliary affairs, is of great interest and real value to every Auxiliary member. It answers more fully than anything else we have, the oft-asked question, "What is the Auxiliary and how does it function?"

It was definitely established that the four districts of the Auxiliary, each with its vice-president, are to be comprised of the following States:

EASTERN (Mrs. William Lett Harris—1112 Matoaka St., Norfolk, Virginia)

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During the past year several volumes have been added to our basic collection of 2000 volumes on surgery and the many phases of medicine and dentistry, until our medical and dental library now numbers approximately 2500 volumes.

By the means of a special fund for books and journals we have added 150 volumes of books and 50 current journals, all carefully selected, lists of which have been published in previous issues of THE JOURNAL. Several members are contributing current issues of journals, and these, with gifts through the Medical Library Association Exchange and from various donors, are adding much useful material to the library.

Every doctor in the State should have access to the leading medical, surgical and special journals of the world, and the most important books. Since one person can subscribe to only a small proportion of such a large number of journals, it is easily seen that the facilities of a library offer a much wider range of reading and investigation. The use that has already been made of our library shows conclusively that there was a real need for it.

Reference questions have been very varied. A telephone call results in material being assembled and made ready for a doctor when he calls at the library. Any further material which we do not have may be borrowed from other libraries through interlibrary loans, and is received promptly within a few days.

As expressed in a recent issue of THE JOURNAL we are mindful of the interest in all material relating to medicine and dentistry and the Library is very glad to receive any material such as books, journals, photographs, old instruments, old case histories, or old office accounts, and we ask your co-operation in preserving them.

Just recently some interesting material has been placed in the library; photographs by

Dr. James M. Winner, and dental instruments by Dr. Charles R. Jeffries, Jr., some dating as far back as 1840.

The library is open each weekday from 10 to 5 (Saturday afternoons if requested), and on Friday evenings from 7.30 to 10.00 p. m.

Out-of-town doctors who come to Wilmington may wish to spend a part of the time at the Delaware Academy of Medicine, either in making use of the library, or while waiting for other engagements. You are cordially welcome.

INFANT NUTRITION

(*Continued from Page* 308)

and some of the other men who have fed lemon juice formulas say no scurvy has developed in any of the groups that they have fed lemon juice formulas to. I used to supplement my formula, after the baby has gained or has gone on for a period of several months, with orange juice.

My purpose in feeding lemon juice, particularly down here, was because it is an easy feeding, the mothers do not have particular difficulty in making it up. In many places they will not buy the orange juice, but the lemon juice is sort of a novel thing to them, so I put it in the formula, and that supplied the vitamin C that sometimes the children would not get otherwise.

As to the gain in weight, the vitamin C probably had something to do with it, but I believe the acidification of the milk makes it more readily digestible, and that has a great deal to do with it because the children have a tendency to take more of it, and being able to assimilate it more readily the infants' gain in weight comes along more rapidly than when we try feeding them the straight formula.

DR. PEARSON: Does the lemon juice curdle the milk?

DR. BAKER: If you put a sufficient amount in. Put the lemon juice in the water and sugar mixture first, and then add the lemon juice mixture to your milk or add your milk to the lemon juice mixture—we have tried it both ways. If you do not put in more than six teasponfulls you will get practically no curdling. It may curdle occasionally, because there is a difference in the individual lemons over which you have no particular control. The lemons will differ somewhat, but you cannot help it.

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MISCELLANEOUS

Death Rates by Occupation

What effect has a man's job on the length of his life? An answer to this question is offered by Miss Jessamine S. Whitney, statistician, National Tuberculosis Association, in a report of a five-year study conducted under her supervision, and made public here today by the Association.

The highest death rate from all causes, for working men, 15 to 64 years of age, was found among hostlers and stable hands, 36.22 deaths per thousand employed. The rate for garage laborers of the same ages was only 6.65. The rate for operatives in harness and saddle factories was 30.55; for aviators, 28.73; for operatives in cigar and tobacco factories, 19.32, which was also the rate found for boatmen, canalmen and lockkeepers. Sailors and deckhands had a rate of 17.28. These may be compared with school teachers, with a rate of 4.42, and social and welfare workers, with a rate of 2.75, or with the rate for all "gainfully employed males," aged 15 to 64 of 8.70 per thousand. In the public service, guards, watchmen and doorkeepers died at the rate of 20.25 per 1,000. Firemen showed a rate of only 6.71. General laborers in the public service had a rate of 7.15, but garbagemen were found to have an index of 11.39. The rate for postmasters was higher than that for mail carriers, the figures being respectively 11.00 and 6.10.

Other comparisons taken from the report are: lawyers, judges, and justices, 7.89; physicians and surgeons, 10.69; clergymen, 10.33; cemetery keepers, 6.50; college presidents and

professors, 2.69. Rates for laborers in the chemical and allied industries were low at 5.13, and laborers in soap factories, 3.29, while for inventors, the rate is 17.65 and for draftsmen 3.21. Managers and officials of real estate companies have a rate of 5.64, but for real estate agents it is 10.09. Chauffeurs and truck and tractor drivers, 6.19; draymen, teamsters and carriage drivers, 17.59; telegraph operators, 10.09, and telephone operators, 4.59.

The report, entitled "Death Rates By Occupation," contains eight thoroughly detailed and comprehensive tables, accompanied by interpretative comment. One of these tables shows death rates for various occupations by broad age groups according to cause of death. Suicides among lawyers, judges, and justices are less than the average for all gainfully employed males included in the study; among doctors, suicides are greater. Unskilled workers kill themselves in greater proportion to their numbers than professional men, and agricultural workers less than semi-skilled workers in other pursuits. Tuberculosis takes its greatest toll among unskilled workers, whose rate is double the average for all workers; the rate for skilled workers is a little under the average; while professional men have a rate less than one-third of the average. After the age of 45, heart disease claims more than the average of professional men; but the rate for agricultural workers is only half the average, and unskilled workers again seem to get the worst of it from heart disease, with the highest rate, for both the 25 to 44 and 45 to 64 age groups.

Some of the other diseases for which detailed rates are given in the tables accompanying the report are; cancer and other malignant tumors; nephritis; cerebral hemorrhage; diabetes; cirrhosis of the liver; and accidents.

The importance of the study is pointed out by Miss Whitney who says in the report: "Without accurate data as to the relative health risk of various occupations, no one knows where to expend the greatest effort in industrial health work. Each industry has come to realize that certain of its occupations are more hazardous than others. Employes in dusty trades, those usually exposed to high temperature or to excessive moisture, or to bad weather conditions generally, are among the workers subjected to the greatest risk. That a certain occupation may be hazardous may be a recognized fact. But how hazardous is it? How much more dangerous is it than other occupations in the same or other industries?"

Many difficulties were surmounted in obtaining the facts contained in the final report, which is based on data of the United States Census Bureau. The principal obstacle encountered was that the death certificates did not disclose occupations in a satisfactory manner for such a study. Another was the frequent discrepancy between the method of classifying occupations on death certificates and census returns, so that a comparison of the number of deaths with the number of persons employed in a given occupation was difficult. Beginning in 1929, an effort was made throughout the United States to obtain uniform reporting of occupations on death certificates, and it was found that ten States, for the year 1930, had their vital statistics in a condition to make studies of them significant. These States were: Alabama, Connecticut, Illinois, Kansas, Massachusetts, Minnesota, New Jersey, New York, Ohio and Wisconsin. The total population for these States comprised 38 per cent of all that for continental United States.

"Another difficulty inherent in studies of occupational mortality," states Miss Whitney, "is the tendency to change occupations on the part of workers whose health becomes impaired or who are growing old. The machinist who becomes a forester after he contracts tuberculosis, and the boiler maker who gets a job as watchman when he grows older, cannot be properly evaluated in any analysis based on census statistics. Only through the intensive study of small groups obtained by the sampling process can this tendency to change occupations be taken into account.

"Not only is one's chance of survival affected by the hazard directly inherent in the job, as in the case of metal filers and zinc miners, etc., but there is too the effect of social or economic status or of different standards of living, as implied by certain occupations. For example, the lowest rate from tuberculosis is

found in the highest economic bracket, and the rates increase steadily through the other social-economic groups (with the exception of agricultural workers) the highest tuberculosis death rate occurring in the lowest social-economic group."

Famous Medical Editor Dies

DR. LEWIS STEPHEN PILCHER

Dr. Lewis Stephen Pilcher, scholar and editor for half a century of the oldest surgical journal in the English language, the *Annals of Surgery*, died on December 24th at eighty-nine years of age. Country school teacher, country practitioner, naval surgeon, student of tropical disease, anatomist, professor of surgery, editor, bibliophile, patriot—these nouns indicate a few of his many interests and activities over a long and intensely useful life.

Lewis Stephen Pilcher entered the University of Michigan at the age of thirteen, and took his bachelor's degree at seventeen, the youngest matriculant and the youngest graduate of that great institution. His master's degree was added within a year; and in that same year he entered upon medical study. This was in 1863 when the Civil War was raging. The next year found him with enough medical knowledge to volunteer as a hospital steward and throw himself into the thick of service to the sick and wounded. Then back to the University of Michigan and the doctor's degree in 1866. Many years later, 1900, this same institution conferred upon him the honorary degree of Doctor of Laws. Practice began in a rural district of Michigan at the age of twenty; at the same time, to guarantee a livelihood, teaching in the little schoolhouse by the blacksmith shop. He rode his horse across the countryside to the call of the sick, followed the current literature of medicine, and for diversion read the classics in their original Greek and Latin.

The next move was to an interneship in a Detroit Hospital. Then a postgraduate course in the hospitals of New York City. And then came the successful examination and appointment as Assistant Surgeon in the United States Navy, in 1867. His marriage, retirement from the Navy, and entrance into private practice, in 1872, all spelled romance and adventure. Then came the years of practice. But Pilcher wanted something more. He organized a dissecting room in his house. This expanded into an adjacent building. A museum and library grew up in connection with it. He dissected also at the Long Island College, and became Adjunct Professor of Anatomy, in 1879, and Surgeon to the Dispensary. In 1885 he was appointed Professor of Surgery at the New York Post-Graduate Medical School.

In 1884 he became editor of the *Annals of Surgery*, which position he has occupied to the present day. This publication, beginning in 1884, was acquired in 1897, by J. P. Lippincott Company. The editorial policy and censorship of advertising have never been relinquished by the editor. If we add to the fifty years of the *Annals of Surgery*, the seven years of the *Annals of Anatomy and Surgery*, and its predecessor which he inspired and dominated, this period of medical editorship establishes him as the dean of medical editors in the United States, if not in the world.

The *Annals of Surgery* will continue with his son, Dr. James Taft Pilcher, as managing editor, with the assistance of an editorial board of eleven of the leading surgeons of the country.

OBITUARY

THOMAS N. MILLIKIN, M. D.

Dr. Thomas N. Millikin, one of the early supporters of the Physicians' and Surgeons' Hospital, died in Wilmington, November 24, 1934, in his 73rd year, of heart disease.

Dr. Millikin was born in Wilmington, July 13, 1862, the son of Thomas and Martha Millikin. His early education was in the local schools, completing the high school course about 1880. He graduated from the Philadelphia School of Pharmacy about 1887. He then entered the University of Pennsylvania, where he graduated in medicine in 1892, beginning his practice in this city in 1895. In this connection Dr. Millikin operated a pharmacy till the latter part of 1933.

In 1911 Dr. Millikin married Miss Emily E. Fegley, by whom he is survived, together with a daughter, Dorothea.

The funeral services were held at his late residence on November 27th, with interment in Old Swedes Cemetery, Wilmington.

BOOK REVIEWS

Fifty Years of Medicine and Surgery: An Autobiographical Sketch. By Franklin H. Martin, M. D., Director-General of the American College of Surgeons. Pp. 449, with 95 illustrations. Cloth. Chicago: Surgical Publishing Company, 1934.

This is the story of a poor boy who "got there," and counts among his friends practically all the leading lights in the surgical firmament. An interesting and inspiring tale, modestly told.

Maternal Mortality in Philadelphia: 1931-33. By the Committee on Maternal Welfare. Pp. 144. Paper. Price, $1.00. Philadelphia: Philadelphia County Medical Society, 1934.

This is an exhaustive study of obstetrical practice in Philadelphia, under the chairmanship of Dr. Philip F. Williams. So excellently is the material assembled and critically analyzed that it won for Dr. Williams the Strittmatter Award for 1933. It concludes with many sensible recommendations for the betterment of a distressing situation not at all peculiar to Philadelphia.

The Heart Visible: By J. Polevski, M. D., Attending Cardiologist, Beth Israel Hospital, Newark, N. J. Pp. 207, with 122 illustrations. Cloth. Price, $5.00. Philadelphia: F. A. Davis Company, 1934.

This book is concerned chiefly with the roentgenological aspects of cardiology, the deductions for the most part appearing to us to be correct.

We believe this portion of the book, from a roentgenological point of view, is very helpful. Roentgen measurements are the most accurate method we have at the present time of outlining the heart and determining its true diameter.

However, some of the roentgenograms given as normal variations seem to us a little too presumptuous. For instance, Figure 4, given as a simple ptotic heart, we believe will stand further investigation. Further, we feel the roentgenologist is working slightly out of bounds when he attempts to make a diagnosis of myocardial degeneration, as in Figure 48. There are several other statements to which we believe exception should be taken, but space is not available for a critical discussion of them.

High Frequency Currents in Performing Biopsies

Jacques P. Guequierre and Fred D. Weidman, Philadelphia (*Journal A. M. A.*, Dec. 1, 1934), point out that the objections of the pathologist to the use of coagulating currents can be overcome largely by adhering to the cutting current. The method is not infallible, owing to such factors as muscular twitch, an unsteady hand or an anatomic location such as the face, which limits the removal to a very small specimen. Barring these conditions the readiness of the apparatus, the bloodlessness, the insensitiveness to postoperative pain and the psychologic effect on the patient all contribute to the securing of a greater number of biopsies, which are so sorely needed for the advance of dermatology in general, to say nothing of the assistance that accrues in confirming the diagnosis.

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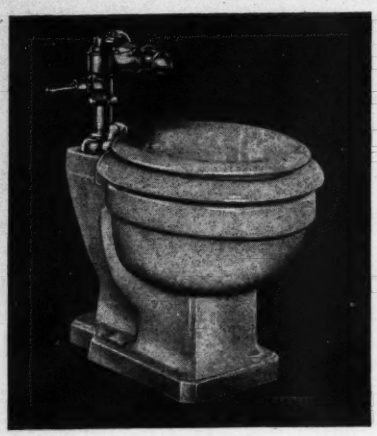

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